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<p>(21) International Application Number: PCT/US88/01201 (22) International Filing Date: 18 April 1988 (18.04.88) (71)(72) Applicant and Inventor: DITTMAR, Edbert, E., L. [US/US]; 1290 N.W. Mall Street, Issaquah, WA 98027 (US). (74) Agent: TINGEY, David, L.; 1100 Maple Ave. S.W., Renton, WA 98055 (US). (81) Designated States: AT (European patent), BE (European patent), BJ (OAPI patent), BR, CF (OAPI patent), CG (OAPI patent), CH (European patent), CM (OAPI patent), DE, DE (Utility model), DE (European patent), FR (European patent), GA (OAPI patent), GB (European patent), HU, IT (European patent), JP, KP, LK, LU, LU (European patent), MC, MG, ML (OAPI patent), MR (OAPI patent), MW, NL, NL (European patent), NO, RO, SE, SE (European patent), SN (OAPI patent), SU, TD (OAPI patent),</p>		<p>TG (OAPI patent), US. Published <i>With international search report.</i></p>
<p>(54) Title: SNOW SKIS WITH MICROGROOVES</p> <div style="text-align: center;"> </div> <p>(57) Abstract</p> <p>A snow ski with one or more small grooves (50) near the undersurface edges (40), with or without edge inserts typically found on the undersurface of snow skis. The grooves are designed to facilitate rapid and precise maneuvering through snow or ice surfaces. The grooves, formed parallel to the ski edge, are relatively short, nominally between 5 centimeters to 45 centimeters in length, to minimize any tendency for a ski with grooves to track in a straight line. They are typically located near the edge of the ski undersurface and longitudinally under the boot attachment position of the uppersurface (30). The grooves can be of various shapes designed to optimize the cutting affect of the groove as it complement the cutting of the sharp ski edge during turning maneuvers in the usual manner of skiing. The ski undersurface can be beveled at its side to reduce any increase in drag during straight skiing that may be caused by adding grooves to the undersurface.</p>		

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SNOW SKIS WITH MICROGROOVES

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TECHNICAL FIELD

This invention relates to snow skis with small grooves near and adjacent the edge of the ski and under the longitudinal location of the boot attachment. The grooves on the bottom of the snow skis are useful for facilitating change in direction by cutting into the snow or ice, such cutting action being additional to the ski edges, thereby providing a better grip by the skis during turning in the usual manner of skiing. The grooves are necessarily limited in length such that the turning advantage is not offset by the tendency of a groove to track in a constant direction. The edge of the ski can also be beveled to minimize any increase in drag caused by the addition of the grooves.

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BACKGROUND ART

Snow skis are intended to permit a skier to move rapidly and precisely down a snow-covered slope. Edge inserts are commonly built into the snow ski undersurface sides, typically made of metal although the inserts can be constructed of any other suitable material, or the ski can be constructed without edge inserts. The ski edges are typically sharp to penetrate severely compacted snow or ice.

Grooves on skis are known in the art, both for snow skis and for water skis. For example, U.S. Pat. Nos. 3,381,972, 3,395,411, 3,907,315, 4,585,249. However, none of these skis with grooves describe the art or provide the advantages of improved performance taught by this invention.

DISCLOSURE OF INVENTION

This invention provides important improvements over previous skis. The objective of this invention is to provide a snow ski that permits a skier to move rapidly and to precisely maneuver down a snow-covered slope. Typically, a snow ski is provided with sharp metal longitudinal edges that cut into snow or ice when a skier negotiates a turn in the normal manner of skiing. It is the objective of this invention to facilitate more precise control during turning by providing additional small, longitudinal cutting edges in the form of grooves of limited length located near the ski undersurface edge, generally located under the boot area of the ski. Where the ski is provided with ski edge inserts, the grooves are typically located in those inserts. The groove shape or shapes are designed to maximize performance requirements for the intended use.

15 An added benefit is that, with sharp edges provided on grooves within the ski undersurface near the edge, the requirement for sharpness on the ski edge is reduced. Thus, edges can be fabricated with less than very sharp edges to reduce occurrence of lacerations to the skier, especially occurring with accidents, to prolong the use of skis otherwise requiring high performance sharp edges, or to

20 extend the mean time between edge sharpening.

It is also the objective of this invention to provide increased turning control and ability while maintaining minimum drag on the ski undersurface and not increasing the tendency of a ski to maintain a straight track, both of which are typically caused when grooves are added to a ski undersurface. This objective is achieved both by providing a slight bevel on the undersurface ski edge and by

limiting the length of the grooves to less than or equal to twenty percent of the length of the ski.

One skilled in the art will recognize the advantages taught by this invention and illustrated by the preferred embodiment presented. The specification and drawings are not intended to represent an exhaustive description of the invention. Obvious applications and extensions of the invention are intended to be within the spirit and scope of this invention.

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BRIEF DESCRIPTION OF DRAWINGS

FIG. 1. shows an enlargement of a ski edge with insert 40, typically made of metal, showing the location of a groove 50 near the edge of the ski.

FIG. 2. shows various possible configurations of a groove, which groove may in fact consist of a set of several separate grooves producing the desired effect.

FIG. 3. shows representative dimensions of a groove 50 and its location in the ski edge insert 40.

FIG. 4. shows the qualitative advantage of providing a groove 50 in gripping the snow or ice as compared to a conventional ski without a groove.

BEST MODE OF CARRYING OUT THE INVENTION

25

This invention teaches a ski with grooves near a ski edge undersurface, in an edge insert if provided in the ski undersurface, the groove dimensions being typically between .5 millimeters and 2.0 millimeters in width, with a minimum depth of .1 millimeters, parallel and adjacent to the sharp ski edge. The insert is

typically made of a metal material but can be similarly provided with any other suitable material. In the alternative, the ski may be constructed without a ski edge, in which case the grooves are located at nominally the same location on the ski undersurface with 5 similar dimensions. The grooves are relatively short, nominally between 5 centimeters and 45 centimeters in length with a maximum length of nominally 20 percent of the ski length. The grooves are limited in length to facilitate turning as the grooves and ski edges cut into the snow and ice to effect a change in direction in the 10 normal manner of skiing. Skis with grooves longer than this length are useful for maintaining a constant direction ("track" or "rail") and increased stability, but they severely impede change in direction. Such skis with long grooves have been used for alpine and cross-country skiing but have not been effective for down-hill 15 skiing.

The position of the groove or grooves is usually directly under the boot attachment location. Grooves 50 are typically located in a ski edge insert 40, usually metal, which forms the undersurface edge of the ski 5, illustrated in FIG 1. The grooves 20 are parallel to the ski edge insert 40 and adjacent to the edge but not at the edge; a groove at the edge would prevent sharpening of the edge and hence reduce the useful lifetime of the ski. As shown in FIG 3 the groove should be between .1 millimeter and 1.0 millimeter from the ski edge.

25 Various configurations and combinations of grooves may be used. FIG 2 shows several examples of groove configurations: a circular groove, two triangular grooves, a rectangular groove, and a "hook-shaped" groove. These sample grooves are illustrative only

and not meant to represent all possible groove shapes included in or defining the scope of this invention.

To minimize any drag on the ski caused by the small groove or grooves, the ski edge insert, or the ski undersurface near the edge, can be beveled slightly. As shown in FIG 3, the bevel should be approximately 1 or 2 degrees, extending from the edge approximately 3.0 millimeters.

Each groove is small, typically between .5 millimeters and 2.0 millimeters in width, with a minimum depth of .1 millimeters. The length of a groove is typically between 5 centimeters and 45 centimeters and located at the center of gravity of the ski, usually under the boot area of the ski. The actual length and width of the groove will vary depending on the physical characteristics and preferences of the skier. A large, or heavy skier will probably prefer a slightly longer groove compared to a light-weight skier. The groove, however, would generally not exceed 20 percent of the total ski length. The shape and dimensions of a groove and the number and combination of groove shapes alters the characteristics of the ski, and therefore will be selected by the skier to achieve the individual performance desired.

INDUSTRIAL APPLICATION

The invention described herein has application to recreational and professional snow skiing.

CLAIMS

Having described the invention, what is claimed is:

1. A snow ski comprising
an elongate ski body having an uppersurface and an undersurface,
5 characterized by one or more grooves in the undersurface, said
grooves being located longitudinally beneath the boot position of
the ski and parallel to and near the edge of the ski, the groove
being limited in length and having small cross-sectional dimensions
such that the groove does not cause the ski to unduly maintain a
10 straight tract, the shape of the groove or grooves formed to provide
a cutting action additional to that of the edge of the insert during
turning maneuvers as in the normal manner of skiing.
2. A ski as in claim 1
characterized in that the undersurface near the ski edge is beveled
15 sufficiently so as to reduce contact of the groove or grooves with
snow during straight traversing activity, thereby reducing the drag
on the undersurface.
3. A ski as in claim 1 or claim 2
characterized in that the length of the groove or grooves does not
20 exceed 20 percent of the length of the ski.
4. A ski as in claim 3
characterized in that the groove or grooves are shaped triangularly.
5. A ski as in claim 3 characterized in that the groove or grooves
are shaped rectangularly.
- 25 6. A ski as in claim 3 characterized in that the groove or grooves
are shaped curvilinearly.
7. A ski as in claim 3 characterized in that the groove or grooves
are shaped circularly.

8. A ski as in claim 3 characterized in that the grooves do not all have the same shape.
9. A ski as in claim 3 characterized in that the grooves do not all have the same dimensions.
- 5 10. A ski as in claim 3 characterized in that the cross-sectional dimensions of the groove or grooves are between .5 millimeters and 2.0 millimeters in width, with a minimum depth of .1 millimeters.

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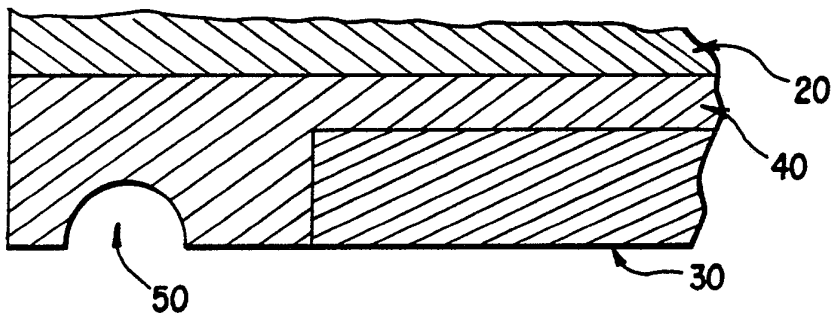


FIG. 1

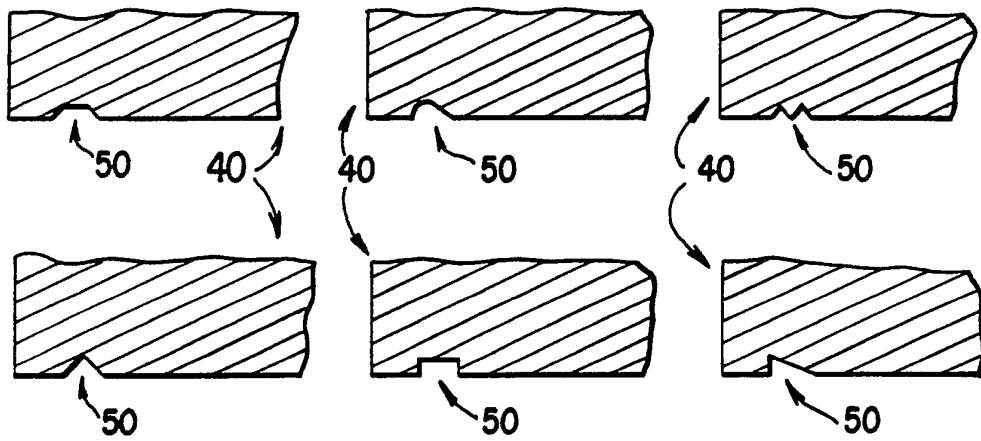


FIG. 2

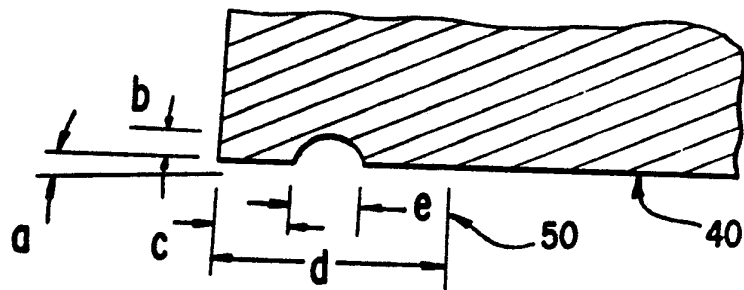


FIG. 3

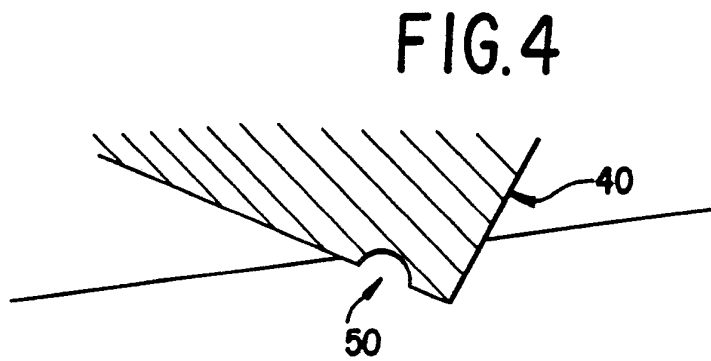


FIG. 4

INTERNATIONAL SEARCH REPORT

International Application No. PCT/US88/01201

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
INT. CL. (4): A63C 5/04		
U.S. CL. : 2801/608		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
U.S.	280/608,609	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X Y	US, A 3,381,972 (MILLER) 07 May 1968	1 — 2-10
Y	DE, A 2065825 (WINTERSBERGER) 20 May 1976	2-10
Y	US, A 4,722,543 (BRUGGER) 02 February 1988	2-10
Y	US, A 3,063,728 (Patterson) 13 November 1962	3-10
Y	US, A 4,175,766 (BARWIN) 27 November 1979	10
A	DE, A 2,403,944 (NAUJOKS) 08 July 1975	
<p>* Special categories of cited documents: ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
15 November 1988	20 DEC 1988	
International Searching Authority	Signature of Authorized Officer	
ISA/US	David M. Mitchell	